

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims presented in the above-identified application:

1. (Currently amended) A system for assaying one or more targets in a sample, comprising:
 - (a) an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;
 - (b) an electric or electronic module for determining electric conductance between the at least two electrodes of each assay set; and
 - (c) reagents for forming depositing a conductive substance ~~ever onto~~ onto a complex formed between said recognition moiety and said target, ~~which~~ wherein the conductive substance, when deposited onto the complex, forms a conductive bridge between the at least two of the electrodes of a set.
2. (Previously presented) A system according to Claim 1, wherein said reagents comprise:
 - (i) a solution comprising nucleation-center forming entities for binding to said target if present in the sample; and
 - (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance on said entities.
3. (Previously presented) A system according to Claim 1, wherein said reagents comprise:
 - (i) one or more reagents to allow deposition and/or formation of said nucleation center-forming entities on a complex formed between said recognition moiety and said target; and
 - (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance from said entities.

4. (Previously presented) A system according to Claim 2, wherein said nucleation-center forming entities are colloid particles.

5. (Previously presented) A system according to Claim 2, wherein said nucleation-center forming entities are metal complexes, clusters, or complexes and clusters.

6. (Original) A system according to Claim 4, wherein said colloid particles are colloid gold particles.

7. (Previously presented) A system according to Claim 5, wherein said metal complexes or clusters are gold complexes or gold clusters.

8. (Original) A system according to Claim 4, wherein said colloid particles are colloid platinum particles.

9. (Previously presented) A system according to Claim 5, wherein said metal complexes or clusters are platinum complexes or platinum clusters.

10. (Currently amended) A system for assaying one or more targets in a sample, comprising:

(a) an assay device having one or more assays sets at least one for each target to be assayed[(;)], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(b) an electric or electronic module for determining electric conductance between the at least two electrodes of each assay set; and

(c) reagents comprising monomers of a conducting polymer which deposit onto or bind to a complex formed between said recognition moiety and said target, and for growing a conductive polymer from deposited or bound monomers, such that upon polymerization of the monomers a conducting bridge between the at least two electrodes of a set is formed.

11. (Previously presented) A system according to Claim 10, wherein said monomers are monomers of polyaniline.

12. (Previously presented) A system according to Claim 10, wherein said one or more targets are one or more nucleic acid sequences.

13. (Original) A system according to Claim 12, wherein said recognition moiety is an oligonucleotide having a sequence complementary to at least a portion of sequence of one of said one or more targets.

14. (Canceled)

15. (Currently amended) A system according to Claim 10, wherein at least two electrodes of the assay set have each [[a]] of the recognition moieties immobilized thereon, these recognition moieties, being the same or different, bind specifically to the same target.

16. (Previously presented) A system according to Claim 10, wherein the recognition moiety is immobilized onto the electrode by means of a linker conjugated or complexed with the recognition moiety and attached by a covalent or non covalent bond, to the electrode.

17. (Canceled)

18. (Previously presented) A system according to Claim 1, comprising a plurality of assay sets of electrodes.

19. (Original) A system according to Claim 18, wherein all assay sets of electrodes are for assaying the same target.

20. (Original) A system according to Claim 18, wherein different assay sets of electrodes or different groups of assay sets are for assaying different targets.

21. (Original) A system according to Claim 20, for simultaneous determination at different targets in a sample.

22. (Previously presented) A system according to Claim 1, when the target is a protein or polypeptide and the recognition moiety is a protein-binding molecule which specifically binds to the target protein.

23. (Original) A system according to Claim 22, wherein said recognition moiety is an antibody or antibody fraction comprising at least the antigen-binding domain of the antibody.

24. (Currently amended) A method for assaying one or more targets in a sample comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties to form a complex;

(c) forming contacting said assay device with reagents for depositing a conductive substance onto the complex formed between said recognition moiety and said target, such that the conductive substance deposits onto the complex and forms a conductive bridge between said at least two electrodes;

(d) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(e) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

25. (Currently amended) A method for assaying one or more targets in a sample, comprising:

(a) reacting the sample targets with a first reagent solution to bind nucleation center-forming entities to said targets;

(b) providing an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(c) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(d) contacting said device with a second reagent solution to form a conducting metal substance over said nucleation center-forming entities for a time sufficient to yield a conductive bridge between said at least two electrodes;

(e) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(f) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

26. (Currently amended) A method for assaying one or more targets in a sample, comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(c) contacting said device with a first reagent solution comprising monomers of a conductive polymer such that said monomers can bind to complexes formed between the targets and recognition moieties;

(d) treating said device such that said monomers will polymerize to form a conducting polymer, such that upon polymerization of the monomers a conductive bridge between the at least two electrodes of at least one set is formed; and

(e) determining a conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

27. (Previously presented) A method according to Claim 26, comprising before step (a) reacting the sample with a second reagent solution containing entities which can form nucleation centers for growing therefrom a conductive polymer from said monomers, such that said entities bind to said targets if present in the sample.

28. (Previously presented) A method according to Claim 26, comprising after step (a) contacting said assay device with a second reagent solution containing entities which can form nucleation centers for growing therefrom a conductive polymer from said monomers, such that said entities bind to said targets if bound to said recognition moieties.

29. (Previously presented) A method according to Claim 24, wherein said targets are nucleic acid sequences and the recognition moieties are oligonucleotides, each of which has a sequence which is complementary to one of the sequences of said targets.

30. (Previously presented) A method according to Claim 24, wherein the level of determining conductance serves as a measure of concentration of the target in the sample.

31. (Currently amended) A kit for use in assaying one or more targets in a sample, comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets; and

(b) reagents capable of yielding for depositing a conductive substance onto a complex formed between said recognition moiety and said target, wherein the conductive substance, when deposited onto the complex, forms a conductive bridge between the at least two of the electrodes of a set.

32. (Previously presented) A kit according to Claim 31, where said reagents comprise:

(i) a solution comprising nucleation-center forming entities for binding to said target if present in the sample; and

(ii) a combination of metal ions and a reducing agent to allow growth of said substance on said entities.

33. (Previously presented) A kit according to Claim 31, where said reagents comprise:

(i) one or more reagents to allow deposition, formation, or deposition and formation of said nucleation-center forming entities on a complex formed between said recognition moiety and said target; and

(ii) a combination of metal ions and a reducing agent to allow growth of said conductive substance on said entities.

34. (Currently amended) A kit for use in assaying one or more targets in the sample comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed[[;]], each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets; and

(b) reagents comprising monomers of a conducting polymer which can bind to the target or to a complex formed between said recognition moiety and said target, such that upon polymerization of the monomers a conducting bridge between the at least two electrodes of a set is formed.

35. (Previously presented) An electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising a first group of N_1 conductors and a second group of N_2 conductors, defining between them $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding a target, bound to at least one of the electrodes.

36. (Previously presented) A device according to Claim 35, wherein distance of center of one assay set to a center of an adjacent assay set is 100 μm or less.

37. (Previously presented) An electric device for determining one or more targets in a sample comprising:

a microelectronic device having a plurality of layers, with a first group of conductors being defined as stripes in one or more first layers and a second group of conductors being defined as stripes in one or more second layers of the device with each of said second layers being separated from a first layer by a non-conductive substance, electrodes of the device being formed as open ends of the conductors by openings or cut-outs in a vertical direction through the layers;

each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding a target bound to at least one of the electrodes.

38. (Previously presented) A system according to Claim 18, wherein the device is an electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of N_1 conductors and a second group of N_2 conductors, defining between them the $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to the one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an array set, each array set having a recognition moiety bound to at least one of the electrodes.

39. (Previously presented) A method according to Claim 24, wherein said device is an electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of N_1 conductors and a second group of N_2 conductors, defining between them $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a

single junction point between them; each pair of electrodes forming part of an array set, each array set having a recognition moiety bound to at least one of the electrodes.

40. (Original) A method according to Claim 39, wherein said device has a plurality of assay sets for each target to be assayed, the method comprising determining the portion of assay sets displaying a conductance above thresholds, out of all assay sets for one target and based on such determination determining concentration of the target in the sample.

41. (Original) A method for detecting one or more targets in a sample by multiplexing comprising:

- (i) contacting the electronic device of Claim 35 with the sample under conditions enabling binding of the targets to recognition moieties; and
- (ii) determining conductance in each assay set.

42. (Previously presented) A method according to Claim 24, wherein the level of conductance between said at least two electrodes is a measure of the concentration of the target in the sample.

43. (Previously presented) A system according to Claim 1, wherein said one or more targets are one or more nucleic acid sequences.

44. (Previously presented) A system according to Claim 43, wherein said recognition moiety is an oligonucleotide having a sequence complementary to at least a portion of sequence of one of said one or more targets.

45. (Previously presented) A method according to claim 24, further comprising contacting said assay device with a first reagent solution to form nucleation-center forming entities for depositing onto or binding to complexes formed between a target and a recognition moiety.

46. (Previously presented) A kit according to claim 31, wherein said reagents comprise nucleation center-forming entities that deposit or bind to a complex formed between

said recognition moiety and said target and for growing a conductive substance from said deposited or bound nucleation center-forming entities.